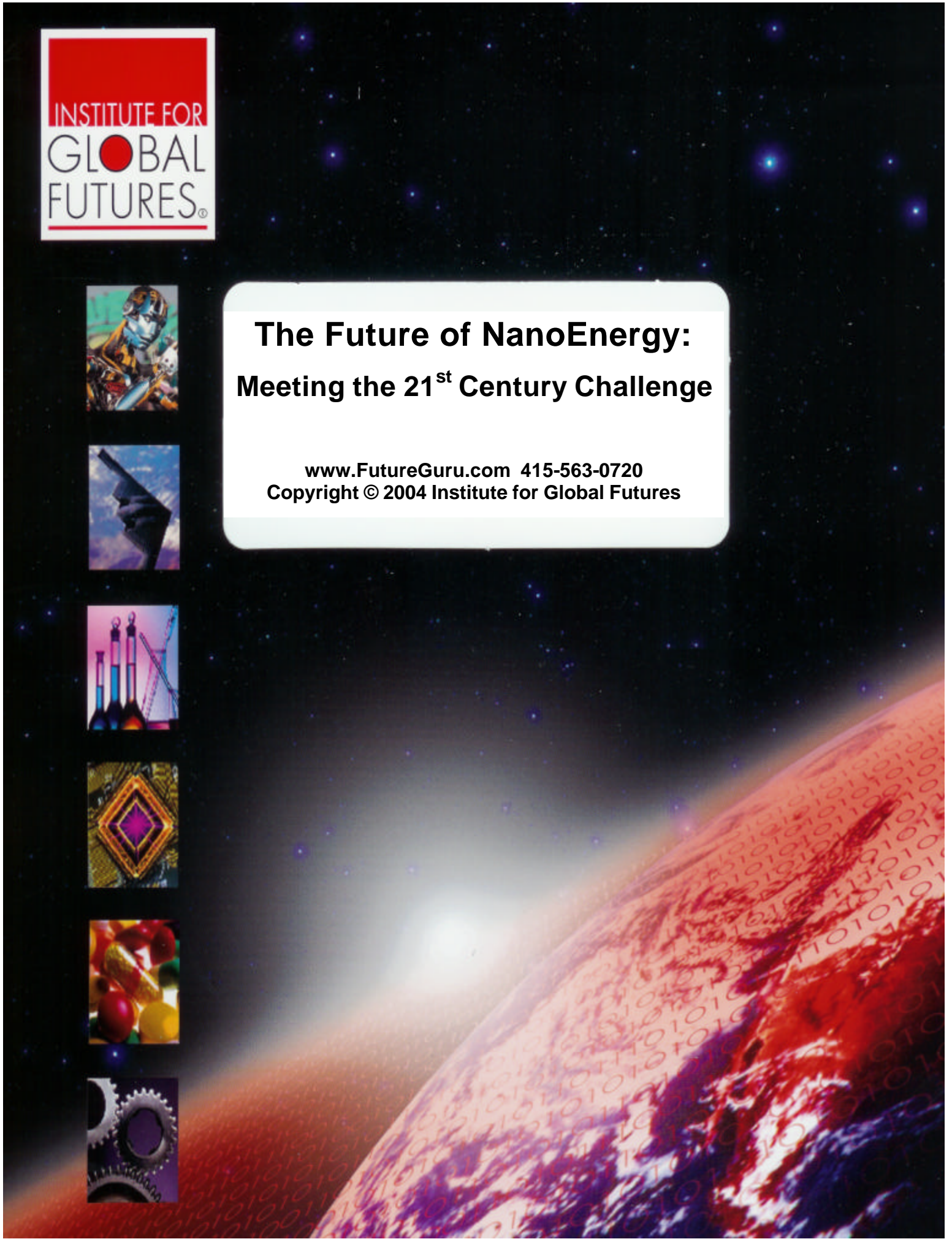




The Future of NanoEnergy: Meeting the 21st Century Challenge

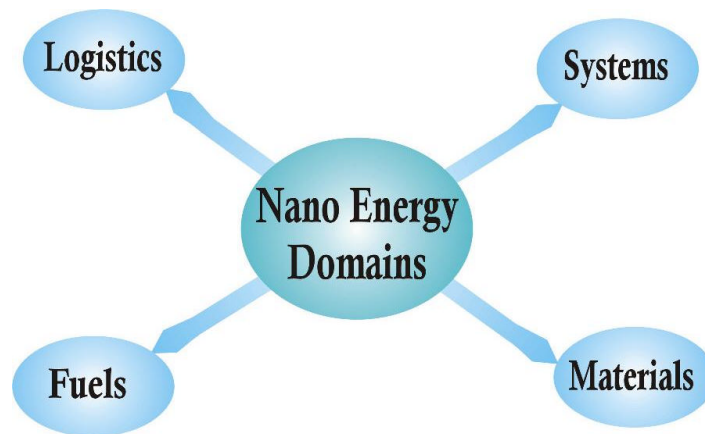
www.FutureGuru.com 415-563-0720
Copyright © 2004 Institute for Global Futures



The Future of NanoEnergy: Meeting the 21st Century Challenge

Table of Contents

1. Introduction: Energy Futures at the Crossroads
2. Where does Nanotechnology fit in?
3. Hybrid nanostructured chemistries and materials
4. From R&D discovery to market
5. The Emergent Nano-Foundry Model
6. Collaborative Opportunities
7. Opportunity Analysis Summary - Connecting the Dots
8. Appendix Review of NanoEnergy Enterprises
9. References



1. Introduction: Energy Futures at the Crossroads

Energy is at the crossroads. There is a crisis of immense proportion brewing. Few people recognize the scope and magnitude of this future crisis. Nevertheless, the impending crisis in energy will be a restrictive force limiting global productivity, growth and security if we do not act to change this future outcome.

With an abundance of energy as the norm it may be difficult for many to envision an energy-restrictive world. As energy is a key driver of global prosperity, the lack of adequate energy access in the future will be a self-fulfilling prophecy without strategic, rapid and large capital investments in technology. This is the main context of meaning that

lies at the foundation of this report. Strategic actions must be taken now to head off a crisis that will affect every nation and every person on the planet in the 21st century. It is towards this vital objective, the formulation of nanoEnergy opportunities that we offer this first report on the future of NanoEnergy.

If we take concerted actions today to address this issue of energy access we can prepare the planet for a prosperous future. If we do not take action, it is a certainty given global population increases, industrialization and growth rates that we will be creating a scenario of greater risk and conflict by the mid 21st century. As energy is critical to the basic functions of modern society such as the economy, food production, health care, jobs, communications, security and transportation any disruption of energy access shall have serious consequences.

This report, on the Future of NanoEnergy explores the efforts undertaken by early stage pioneers in the corporate world who seek to head off this crisis as well as exploit the commercial opportunities of a post-oil economy. The challenges are significant and time is of the essence as we move into increasing demand scenarios in the 21st century.

Clearly given any modest forecast of energy needs in the near future, an abundance of data indicates we will not be able to sustain current levels of global economic growth into the mid 21st century with the energy resources currently available. This includes all energy resources including petroleum-based, nuclear and renewables. We need to explore new frontiers—nanoEnergy is one such effort.

Energy is such a pervasive resource that it affects every human endeavor. Even to attempt to de-link energy from transportation, food, habitat, security, commerce or health care would be absurd. Energy fuels the present society and economy and is essential to the future prosperity of the world.

A future without energy abundance would curtail many domains essential to human existence let alone growth, progress or productivity. Energy is essential to a secure and productive modern global civilization. But the very energy that we have come to chiefly

depend on, primarily petro-sources, is fraught with many complications that only grow more hazardous as a dependency over time. We need to alternatives to augment our petro-energy sources that are renewable, sustainable, clean and abundant. The focus of this report considers nanoEnergy as an enabler of this strategic direction.

An energy restrictive global scenario is currently forecasted unless drastic changes are made fast in identifying new energy sources. In the post-oil economy of the 21st century new energy resources, renewables, alternatives and even cleaner traditional sources must be planned for today. We are late to investing in this future. There is urgency, renewed after the post-9/11 world and the recent events surrounding the escalated global war on terrorism

Nanotechnology specifically plays a significant role in this crisis, because it represents an emergent technical and strategic platform for enabling materials and fabrication processes not previously available via other means. Nanotechnology, the manipulation of matter at the atomic level, may lead to new energy sources not contemplated before. Nanotechnology when combined with energy, maybe express an entirely new paradigm of sustainable energy.

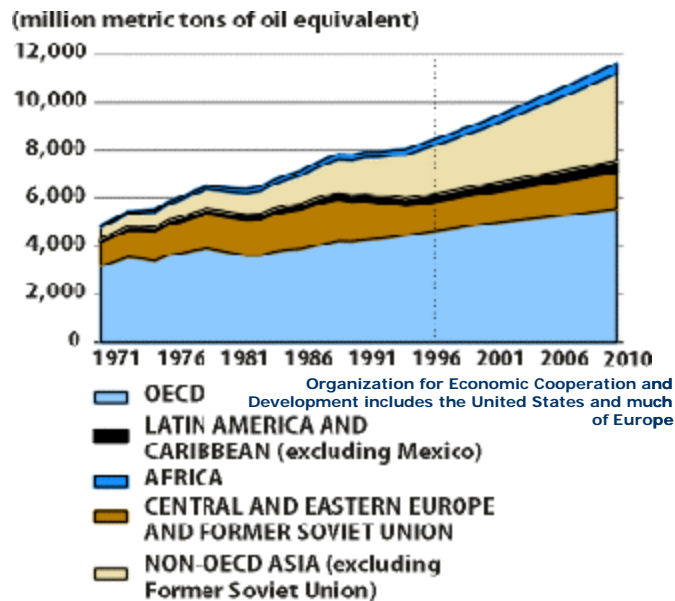
NanoEnergy may accelerate the efficiencies of solar, geothermal or hydrogen sources speeding up the access to these renewables. NanoEnergy may actually enable the production of more cost-effective even cheaper sources of energy; perhaps new hybrid energy sources. Also, nanoEnergy may accelerate the transition towards a clean, sustainable, and renewable energy resource that promotes self-reliance from our current petro-energy dependence.

It must be clearly stated that there are risks associated with the pursuit of nanoEnergy. We are entering new scientific domains. But the imagination, innovation and investment in shaping a new future, with the hope of inventing new sources of sustainable energy, looms large. This is one of the great challenges facing humanity today.

NanoEnergy could be divided into four specific domains: Logistics, Systems, Fuels, and Materials. Applied nanotechnology, as a pathway toward commercial implementation of various modalities of

alternative and renewable energy, plays a key role in each of these four domains. This is the current map of NanoEnergy domains that point to the research and development efforts of this new technology.

Specifically, however, nanotechnology will have its greatest impact in the arenas of fuels and materials, and it is with this focus in mind that this report has been prepared.



World Energy Usage Outlook

Source: International Energy Agency, World Energy Outlook

The purpose of this report is to provide an overview of some of the more compelling, and commercially relevant examples of technologies and IP (intellectual property) that are emerging. We have examined the world of research, investment and startup ventures.

To Purchase the full report, please contact info@futureguru.com or call 415-563-0720.